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EVERSOURCE



PROUD SPONSORS OF



The Sponsors of Energize Connecticut, and in partnership with Connecticut Passive House and BuildGreenCT, are pleased to offer *Passive House & All-Electric Homes Initiative* to support workforce development and help transform the energy efficiency and building construction industries in Connecticut.



For more information, please visit EnergizeCT.com/passive-house
or email PassiveHouseTrainingCT@icf.com

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Take energy efficiency to a new level

Residential New Construction Passive House Multi-family buildings with five units or more



PASSIVE HOUSE INCENTIVE STRUCTURE FOR MULTI-FAMILY (5 UNITS OR MORE)				
Incentive Timing	Activity	Incentive Amount	Max Incentive (Per Unit)	Max Incentive (Per Project)
Pre-Construction	Feasibility Study ¹	Up to 100% of Feasibility Study Costs	N/A	\$5,000.00
	Energy Modeling ²	75% of Energy Modeling Costs (Before 90% Design Drawings)	\$500.00	\$30,000.00
		50% of Energy Modeling Costs (90% Design/50% Construction)	\$250.00	\$15,000.00
Post Construction	Certification ³	Up to 100% of Certification Costs	\$1,500.00	\$60,000.00

1. Feasibility Study will require documentation in the form of a Feasibility Study report and invoice from the Passive House Consultant
2. Incentives will only be awarded prior to 50% Construction Drawings for Passive House projects. No incentives will be granted after 50% Construction Drawing set.
3. Certification may be either through PHIUS, PHI, or EnerPHit certification offerings.

Next steps you can take...
Contact your Energy Efficiency Representative or

Go to [EnergizeCT.com](https://www.energizect.com) or call 1-877-WISE USE for more details.

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The future of high-performance,
all-electric homes starts here.



	LEVEL 1		LEVEL 2	
	Single Family (Detached Dwellings)	Multifamily (Attached Dwellings)	Single Family (Detached Dwellings)	Multifamily (Attached Dwellings)
Total UA Alternative Compliance or HERS Index Score [†]	Total UA ≥ 7.5% better than 2021 IECC or HERS Index Score ≤ 55		Total UA ≥ 15% better than 2021 IECC or HERS Index Score ≤ 45	
Heat pump for space heating ^{††}	Required		Required	
Space Conditioning Connectivity & Controls ^{†††}	Optional		Required	
Heat pump for water heating	Required	Optional	Required ^{††††}	
Hot Water Distribution ^{†††††}	Required		Required	
Envelope Infiltration Rate (ACH)	ACH50 ≤ 2.5	CFA > 850ft ² : ACH50 ≤ 4.0 CFA < 850ft ² : ACH50 ≤ 5.0	ACH50 ≤ 2.0	CFA > 850ft ² : ACH50 ≤ 3.0 CFA < 850ft ² : ACH50 ≤ 4.0
Duct Leakage Rate (CFM)	2021 IECC code minimum requirements		All ductwork must be located in conditioned space	
Balanced Ventilation Systems	Optional		Required HRV/ERV (≥70% SRE / ≥40% TRE)	
Induction Cooking	Optional		Required ^{††††††}	Optional
Electric Vehicle Readiness ^{†††††††}	Required		Required	

ALL-ELECTRIC HOME INCENTIVE STRUCTURE		
	Level 1	Level 2
Single Family	\$7,500	\$10,000
Single Family Attached	\$3,000	\$5,000
Multifamily	\$1,500	\$2,500

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Thank You

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or email PassiveHouseTrainingCT@icf.com



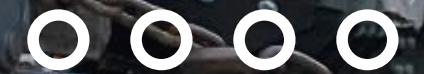
Brightcore EDGE™

The Next Generation of Geothermal Heating and Cooling

Prepared for: CTPH & BuildGreenCT

November 6, 2024

Proprietary & Confidential



TODAY'S AGENDA

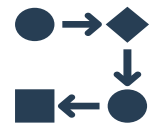
GALVANIZE LUNCH & LEARN



INTRODUCTION TO BRIGHTCORE



BASICS OF GEOTHERMAL



SYSTEM CONSIDERATIONS



INNOVATIONS IN GEOTHERMAL SYSTEMS

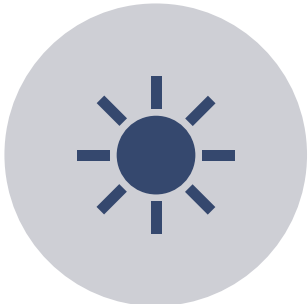


QUESTIONS AND DISCUSSION

BRIGHTCORE ENERGY

BASIC FACTS

- » Established in 2015
- » 120 employees
- » Northeast and Mid-Atlantic states
- » Locations
 - » Armonk, NY
 - » Brooklyn, NY
 - » Rock Tavern, NY
 - » Stockholm, SE



Hundreds of energy efficiency and renewable energy projects completed



Extensive client relationships in the private and public sectors



Backed by SER Capital Partners with \$82 million equity commitment

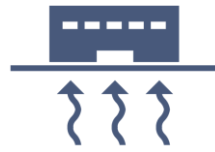


CRAI'S NEW YORK BUSINESS 2024
NOTABLE
LEADERS
IN SUSTAINABILITY



BRIGHTCORE DEPLOYS A RANGE OF ELECTRIFICATION SOLUTIONS FOR C&I CUSTOMERS

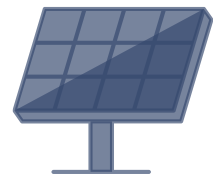
including...



GEOHERMAL HEATING & COOLING



LED LIGHTING & CONTROLS



**COMMERCIAL & COMMUNITY SOLAR
AND BATTERY ENERGY STORAGE**

Our **building electrification solutions** capitalize on market forces and **address regulatory mandates** and stakeholder considerations.



THE MARKET IMPERATIVE

REASONS FOR DECARBONIZATION AND ELECTRIFICATION

DRIVERS.....



Legislative & Regulatory Mandates



Stakeholder Objectives

.....CONSIDERATIONS

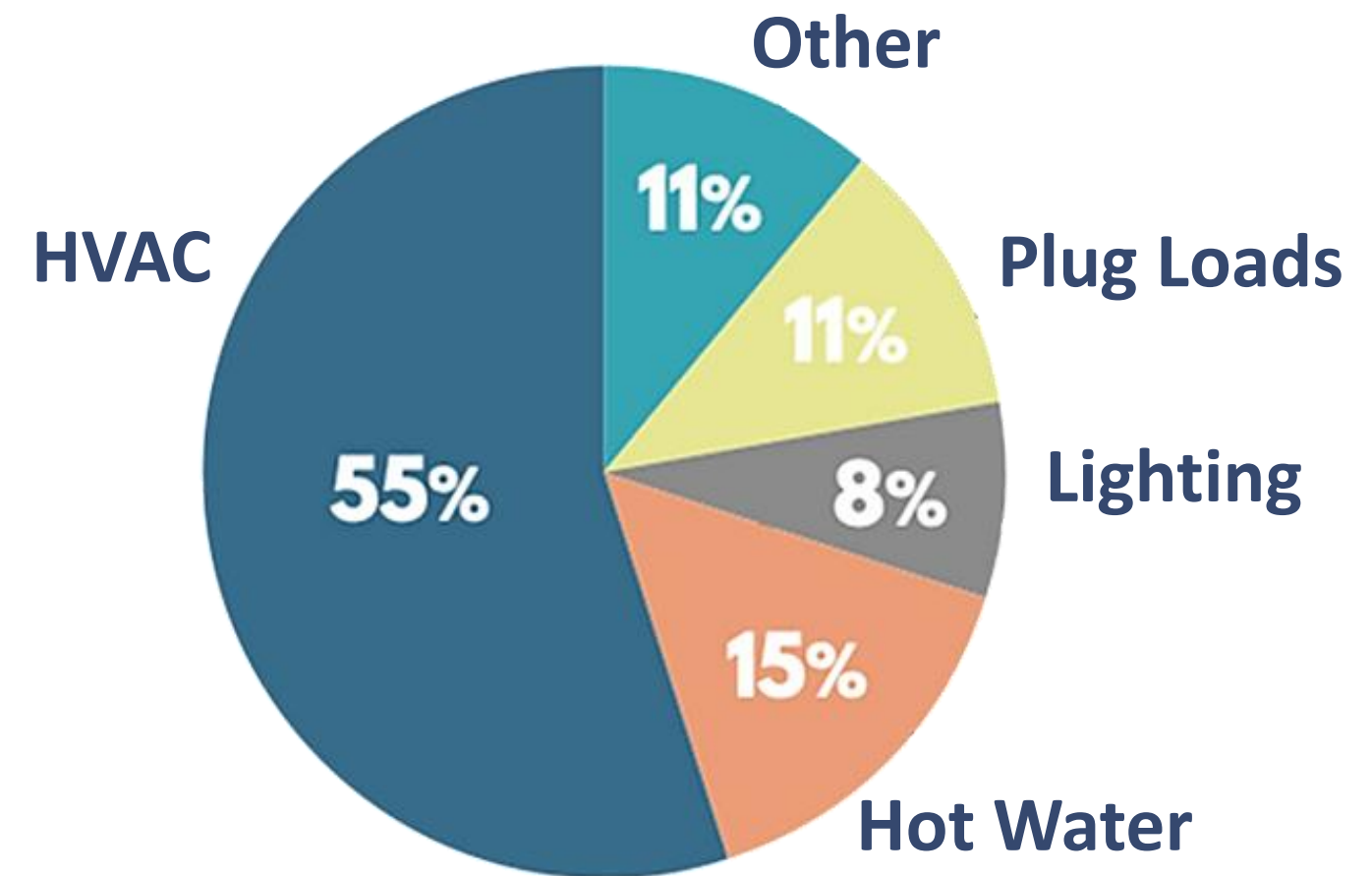


CAPEX & Operational Costs



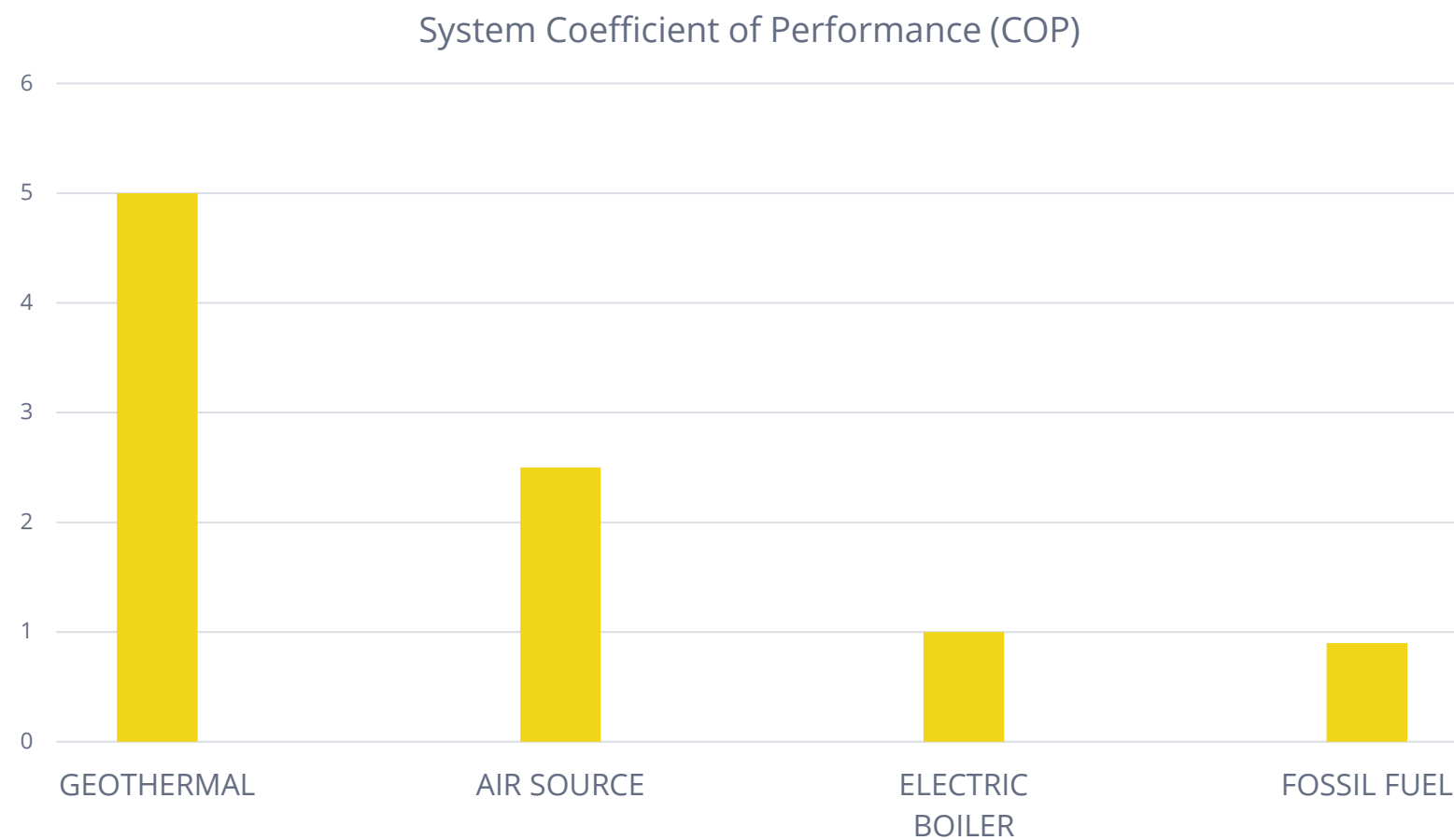
Impact to Electrical Infrastructure

TYPICAL NYC BUILDING GHG EMISSIONS PROFILE



HVAC & HOT WATER ACCOUNTS FOR 70% OF GHG EMISSIONS

HEATING AND COOLING SOLUTIONS COMPARISON OF SYSTEM EFFICIENCY DATA



**Geothermal is the Most Efficient,
Lowest Cost Solution
For Electrified Heating & Cooling**

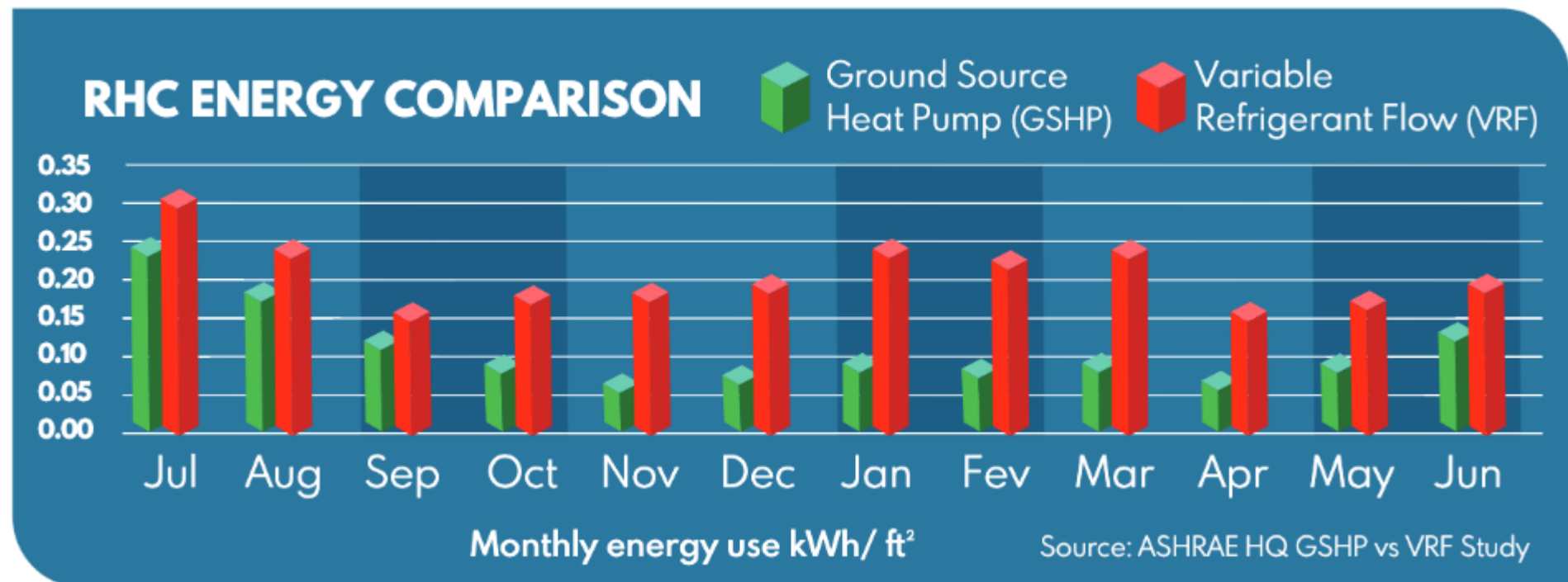
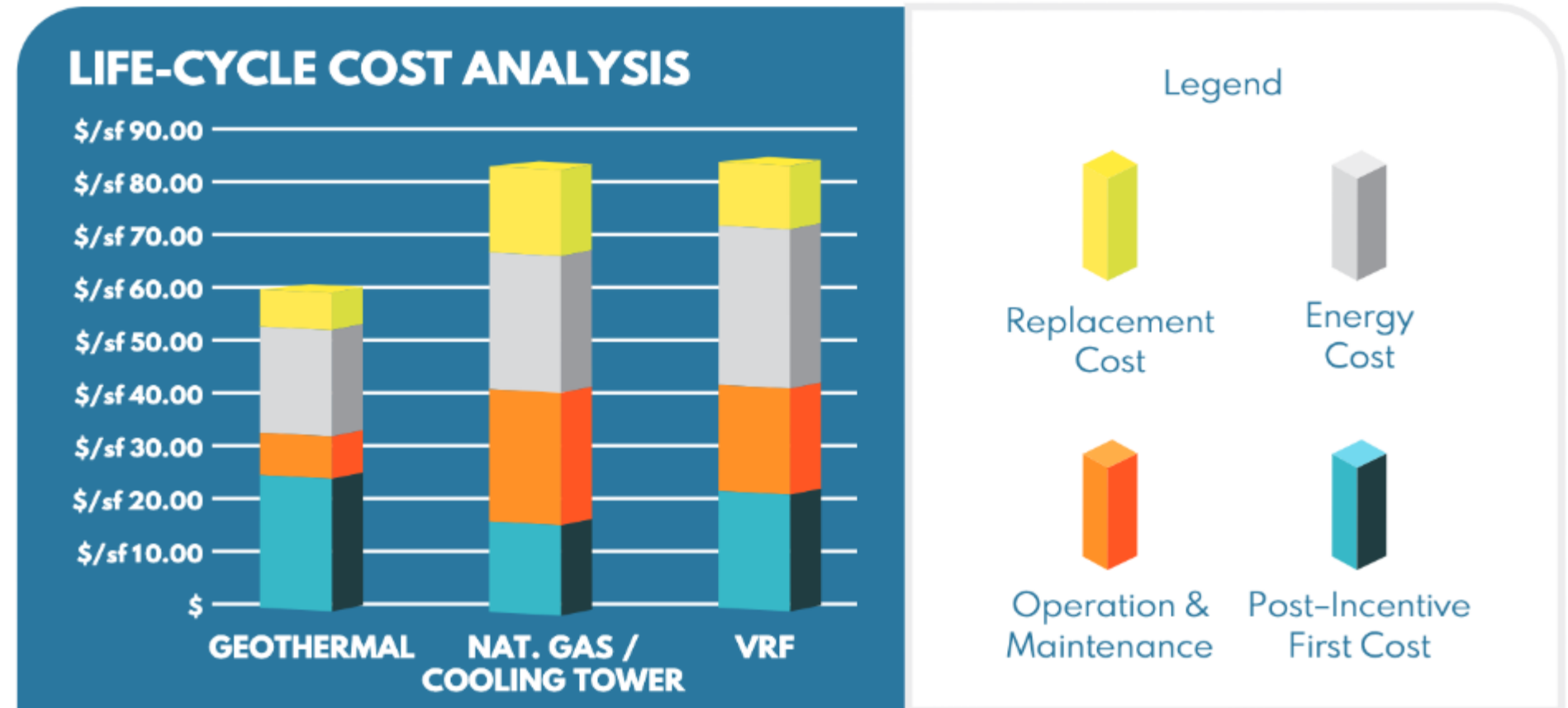
- ✓ **Lowest Operational Cost**
- ✓ **Longest Operational Life**
- ✓ **Largest Federal, State, Local,
& Utility Incentives**

***Geothermal is 5x more efficient than Electric Boilers and
2-3x more efficient than Air Source Heat Pumps***

HIGH PERFORMANCE RENEWABLE HEATING & COOLING

Ground source geothermal offers the lowest life-cycle costs when considering 20-year energy and operational costs.

Geothermal provides superior energy efficiency compared to air source heat pump solutions.

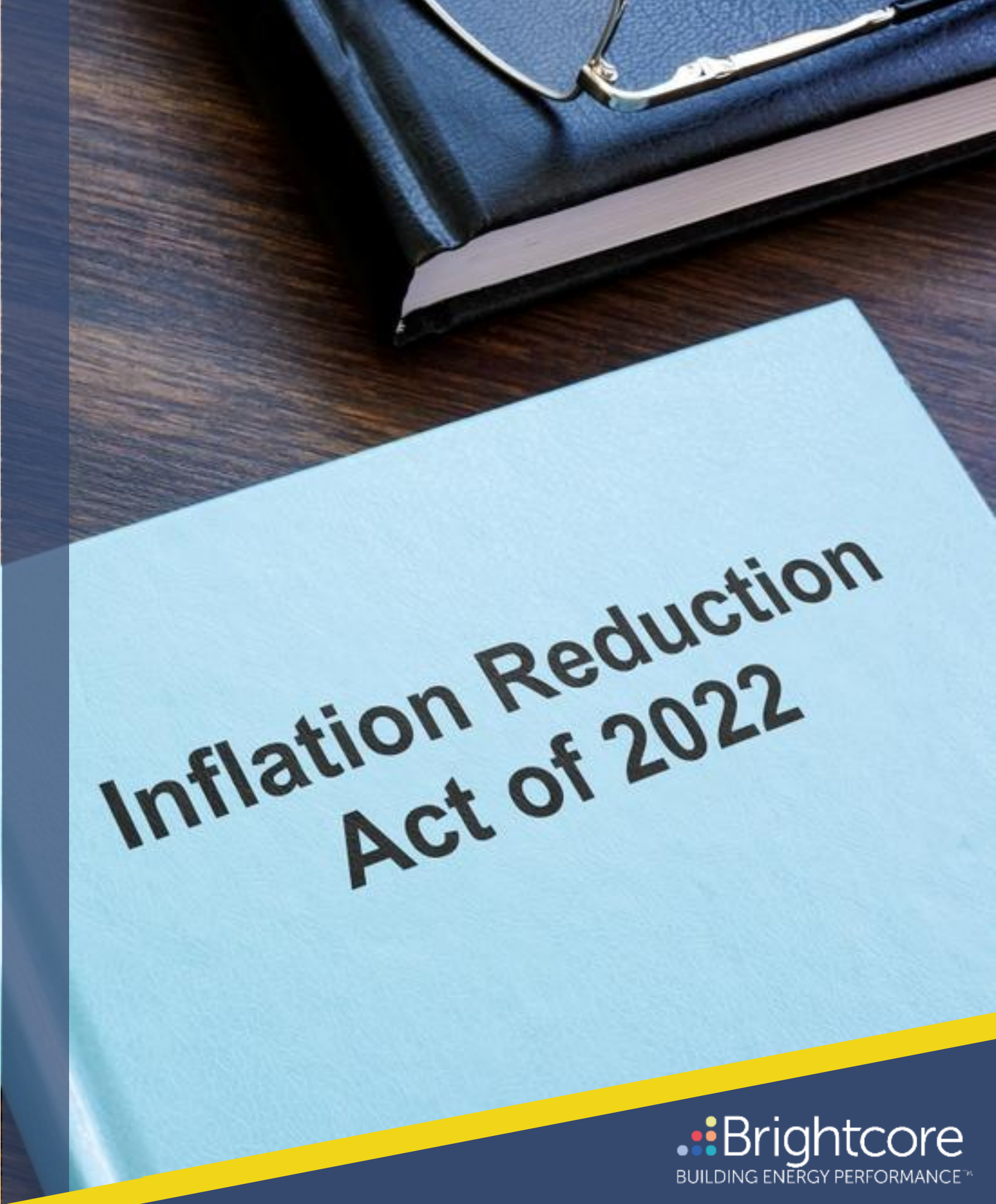


INFLATION REDUCTION ACT (H.R.5376)

CURRENT FEDERAL INCENTIVES

Investment Tax Credits (§ 48)	Base	Bonus Rate (x5)
Base Credit	6%	30%
Domestic Content Adder	2%	10%
Energy Community Adder	2%	10%

NOTE: Additional local installation and operational incentives may be available based on location, utility programs and demand reduction. Please contact Brightcore for additional details.



Inflation Reduction
Act of 2022

GEOHERMAL BASICS

 **Brightcore**
BUILDING ENERGY PERFORMANCE™



BRIGHTCORE GEOTHERMAL COMPREHENSIVE WORKFLOW



- ✓ **Proprietary software** tools qualify project and provide actionable economic profile
- ✓ In-house **geothermal and mechanical engineers, PhD scientists, finance professionals and incentive experts** collectively optimize design, cost, and performance
- ✓ **In-house certified master drillers, accredited installers, inspectors, and specialty drilling equipment** deliver projects with unmatched safety, quality, speed and efficiency
- ✓ Integrated asset **optimization, monitoring, and maintenance** capabilities ensure long-term peak performance
- ✓ Market leading **performance guarantee ensures system will meet projected KPI's;** thereby derisking client's project investment

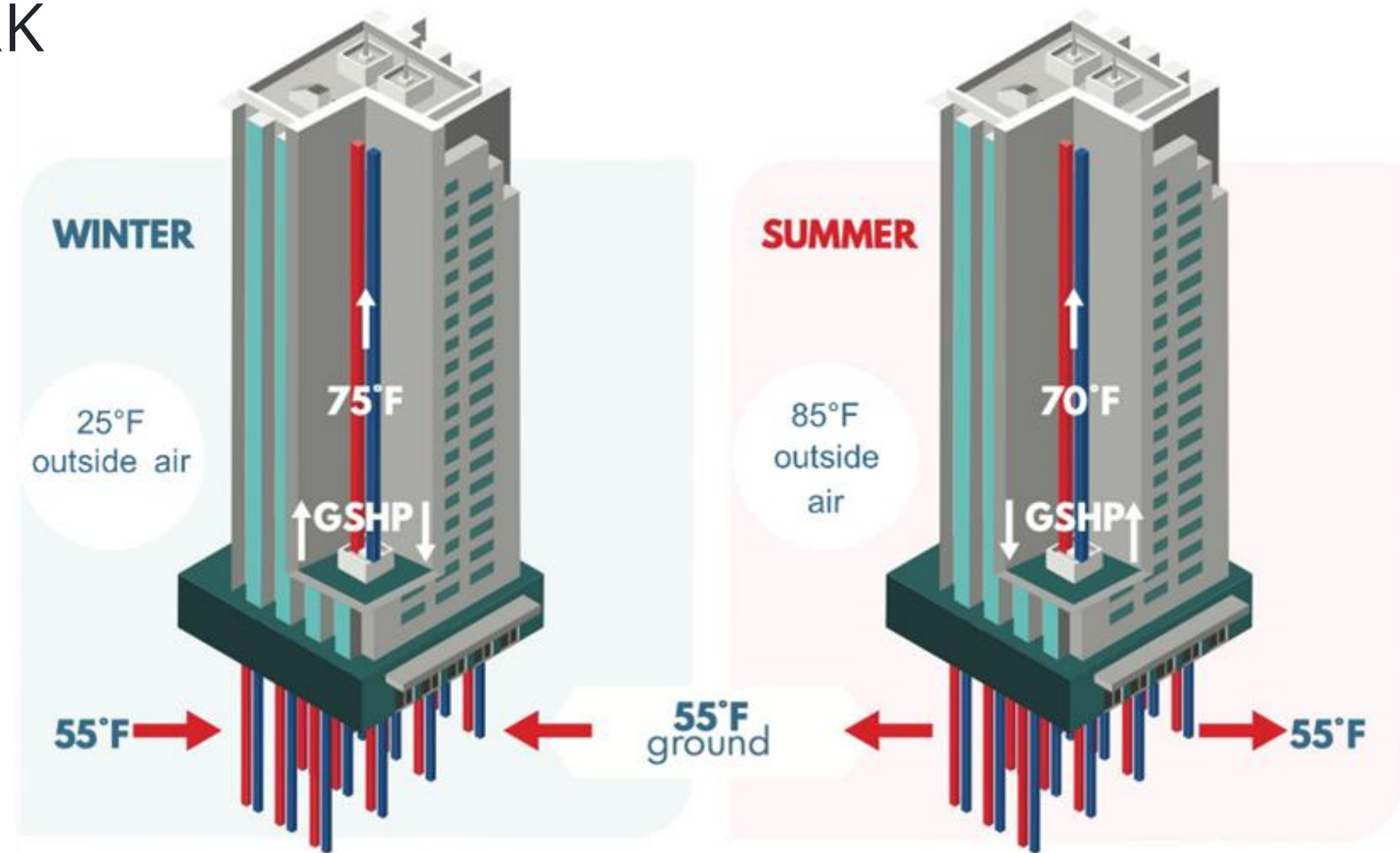
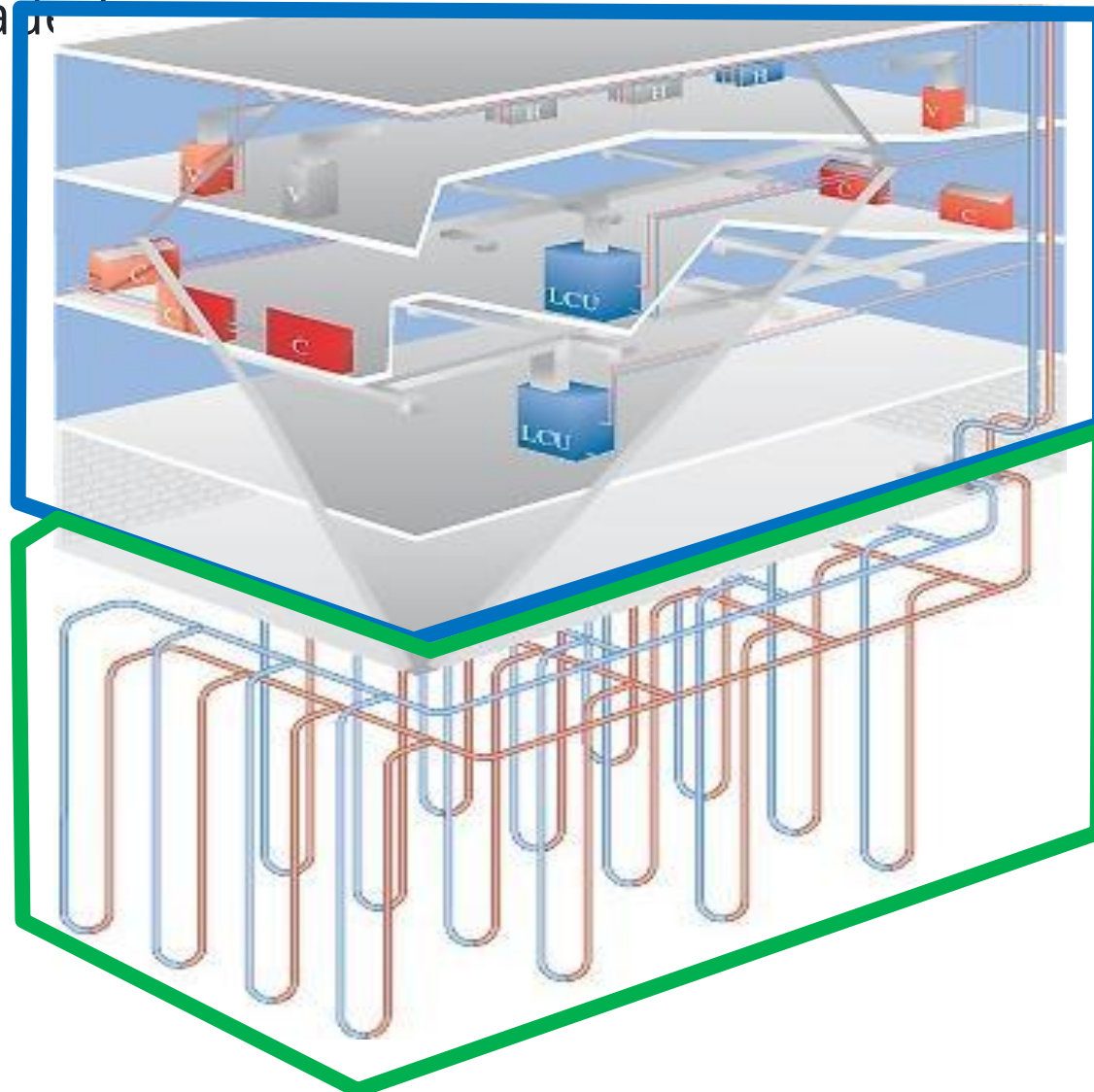
GEOHERMAL SYSTEMS

WHAT THEY ARE & HOW THEY WORK

Building System (HVAC):

Water Source Heat Pumps, Interior Piping, Circulating Pumps, DHW Heating Equipment, etc.

Ground Connection (GLHE): Ground heat exchanger (sub-surface lateral piping, and the manifold / headers)

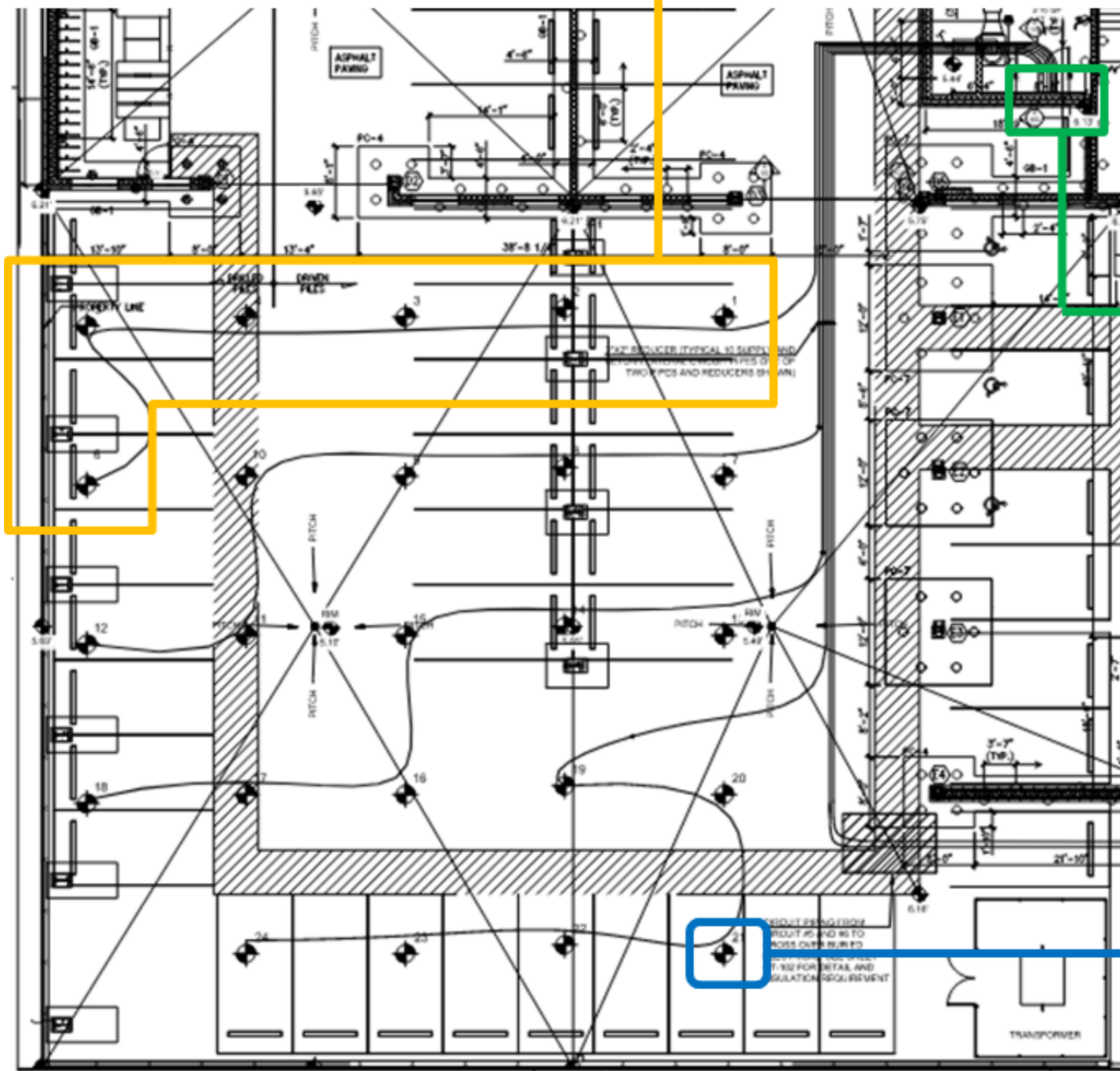


In the winter, the heat pump boosts the relatively warm ground temperature to **heat the building**.

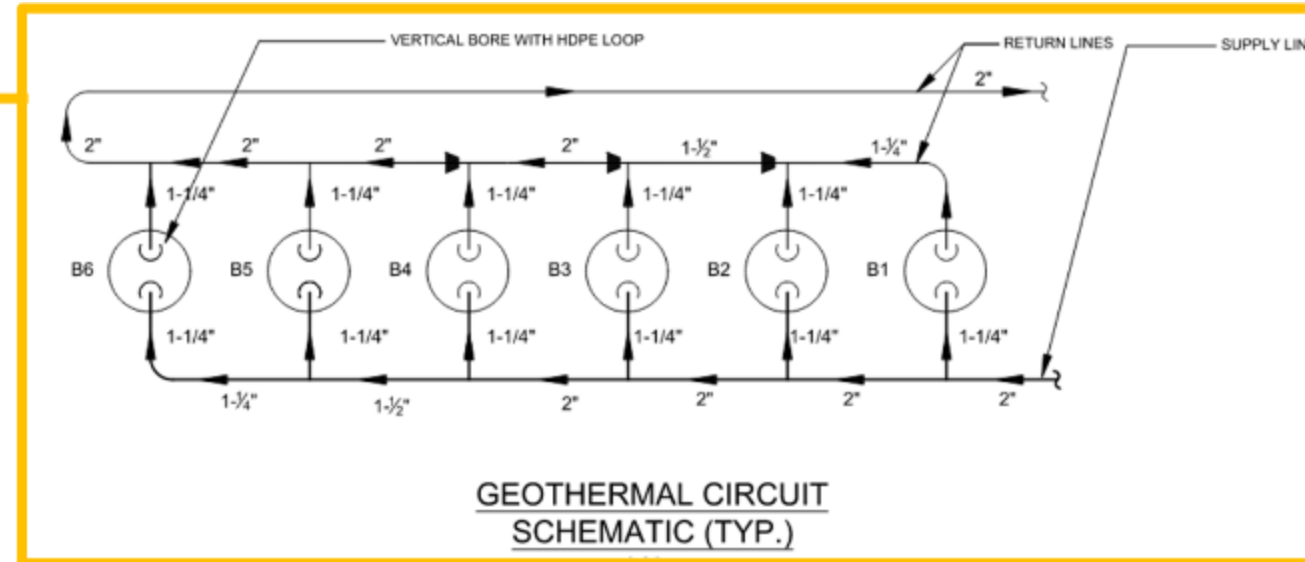
In the summer, the geothermal system rejects heat to the cool ground and uses the cool ground temperatures to operate at **extremely high efficiencies**.

GEOHERMAL SYSTEMS

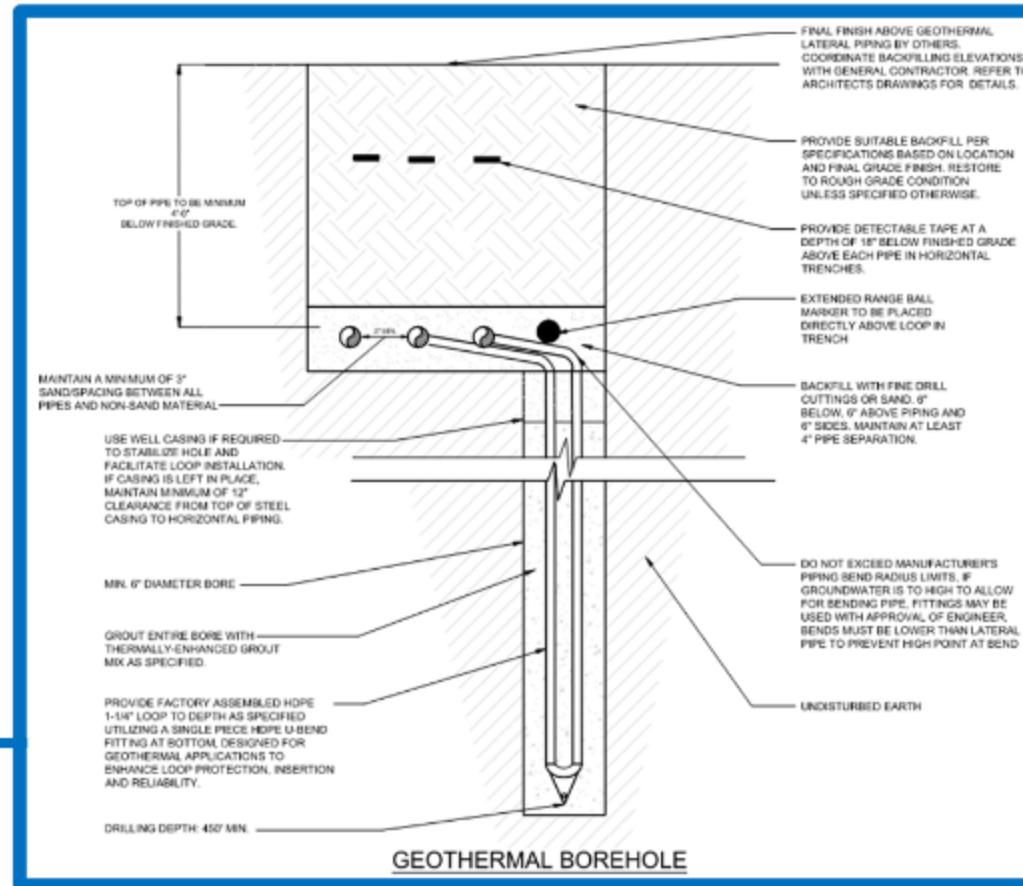
GROUND CONNECTION



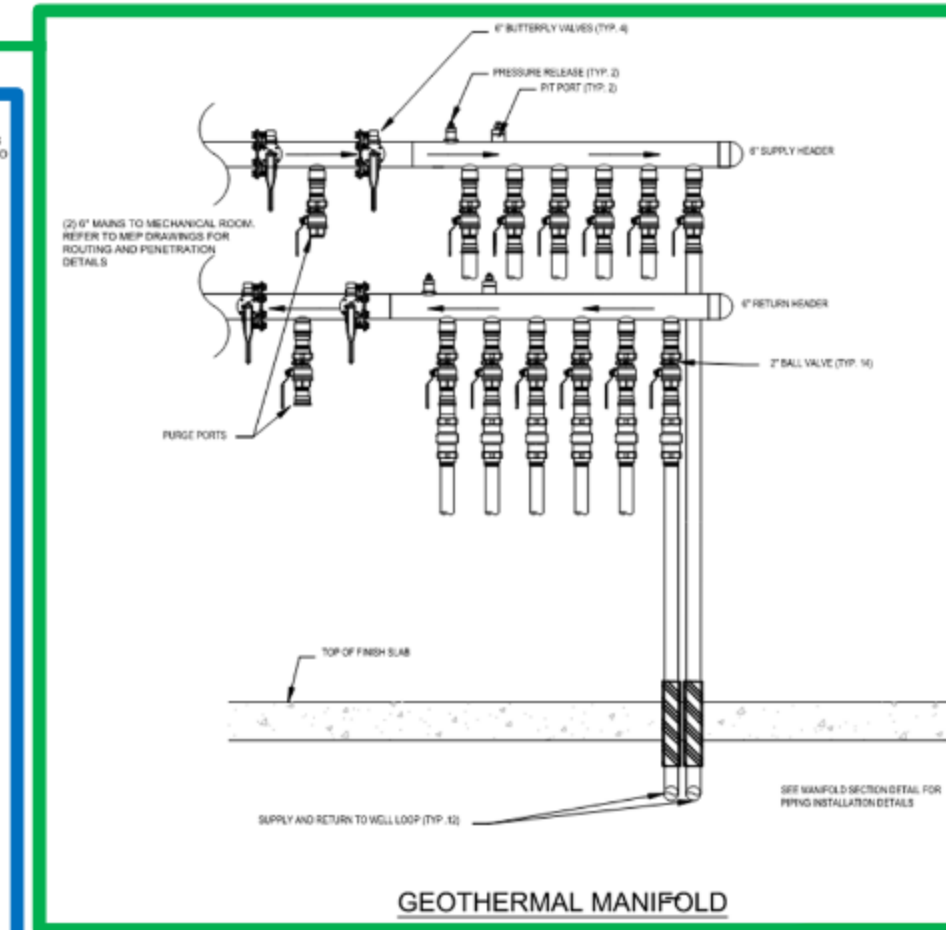
Plan View



GEOHERMAL CIRCUIT SCHEMATIC (TYP.)

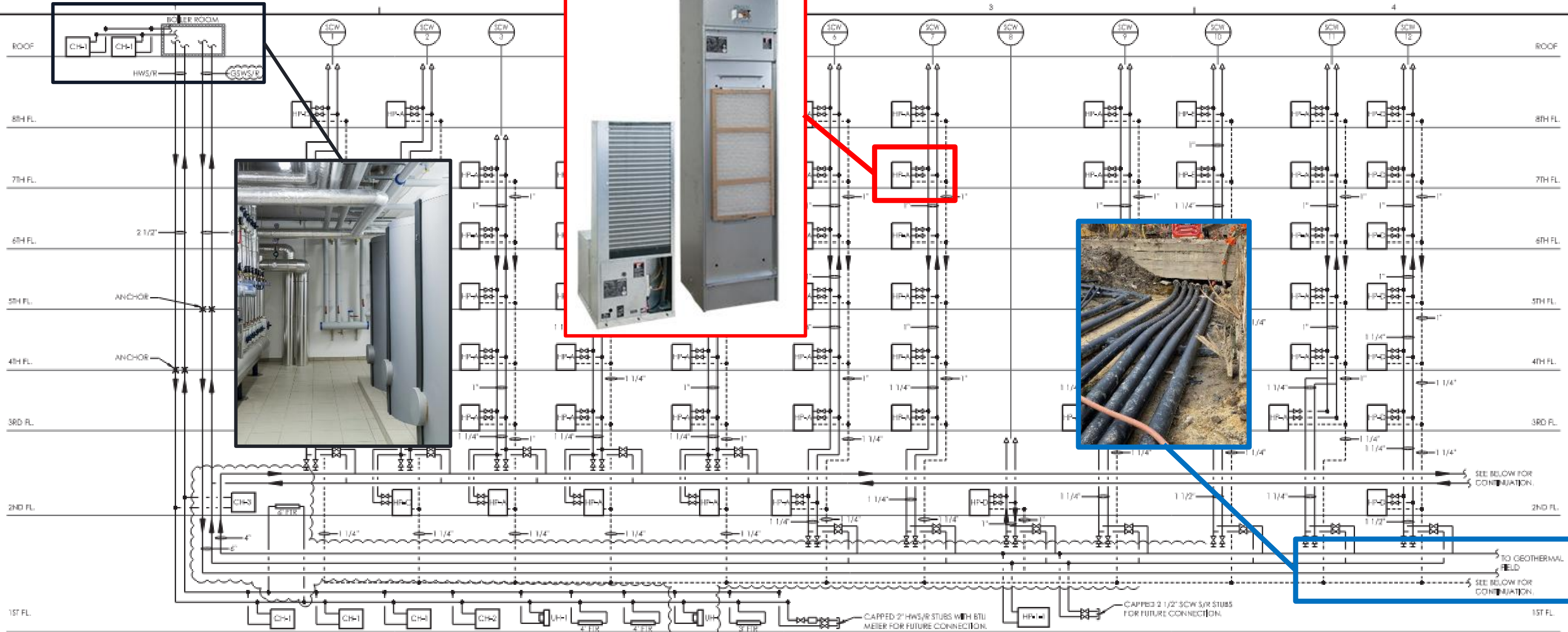


GEOHERMAL BOREHOLE



GEOHERMAL MANIFOLD

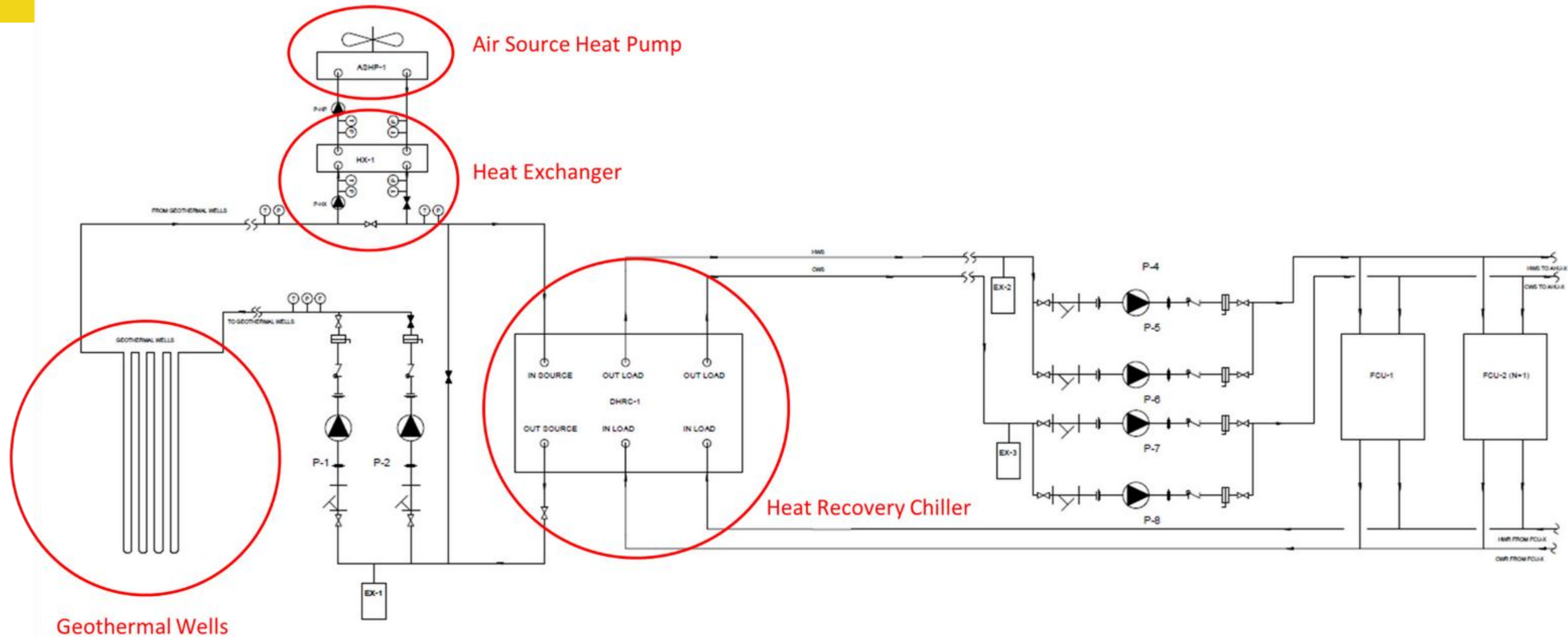
GEOHERMAL SYSTEMS BUILDING SYSTEMS



Side View

GEOTHERMAL SYSTEMS

HYBRIDIZED SYSTEMS



SYSTEM CONSIDERATIONS

 **Brightcore**
BUILDING ENERGY PERFORMANCE™



GEOTHERMAL SYSTEMS

Borefield Construction



Retrofit Considerations

Surface area constraints, Drilling & Geology, Load requirements & Interior Mechanicals, and Incentives

Single U-Bend (Conventional)

Materials: High Density Polyethylene (HDPE)

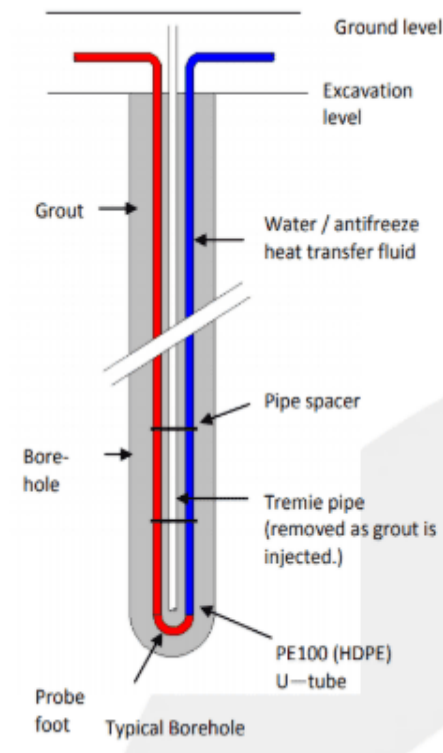
Typical Installed Depth: 400-850 ft

Best Applications:

- Large open areas such as playing fields or quads. Can also be deployed in constrained areas using inclined approaches.

Benefits & Tradeoffs:

- Lowest cost heat exchanger.
- Relatively easy installation.
- Compatible with inclined drilling approaches.
- Lower capacity per installed foot.



Rygan (Co-Axial)

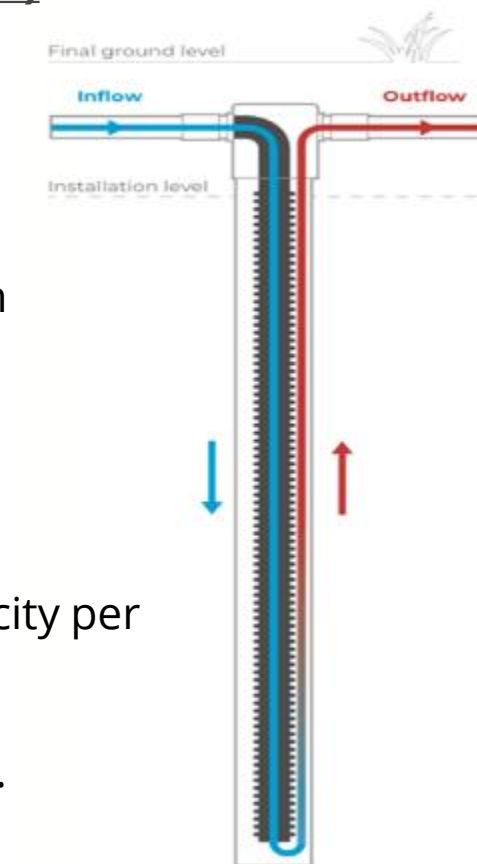
Materials: Woven glass
Typical Installed Depth: 600-1,500 ft

Best Applications:

- Excellent for dense urban environments with large capacity needs.

Benefits & Tradeoffs:

- High performance heat exchanger - greater capacity per installed foot.
- Higher installation cost.
- More difficult installation.



BRIGHTCORE ENERGY GEOTHERMAL DRILLING



TRUCK MOUNTED RIG



TRACK MOUNTED RIG



TRACK MOUNTED MINI RIG

BRIGHTCORE *URBAN GEO*[™] EXPANDS THE APPLICABILITY OF GEOTHERMAL HVAC

ENABLES SPACE CONSTRAINED GEOTHERMAL INSTALLATIONS

Brightcore *UrbanGeo*[™] technology makes it possible for installation to occur without any disruption to building operations or occupants

- Accessibility
- Installation Flexibility
- Low Noise
- Minimal Vibration
- Dust Elimination
- Controlled Water & Spoils Management



Brightcore's custom mini-rig entering and drilling from within the basement of a century-old co-op in Manhattan

GEOSCIENTIFIC CONSIDERATIONS

Regional to site-specific analysis

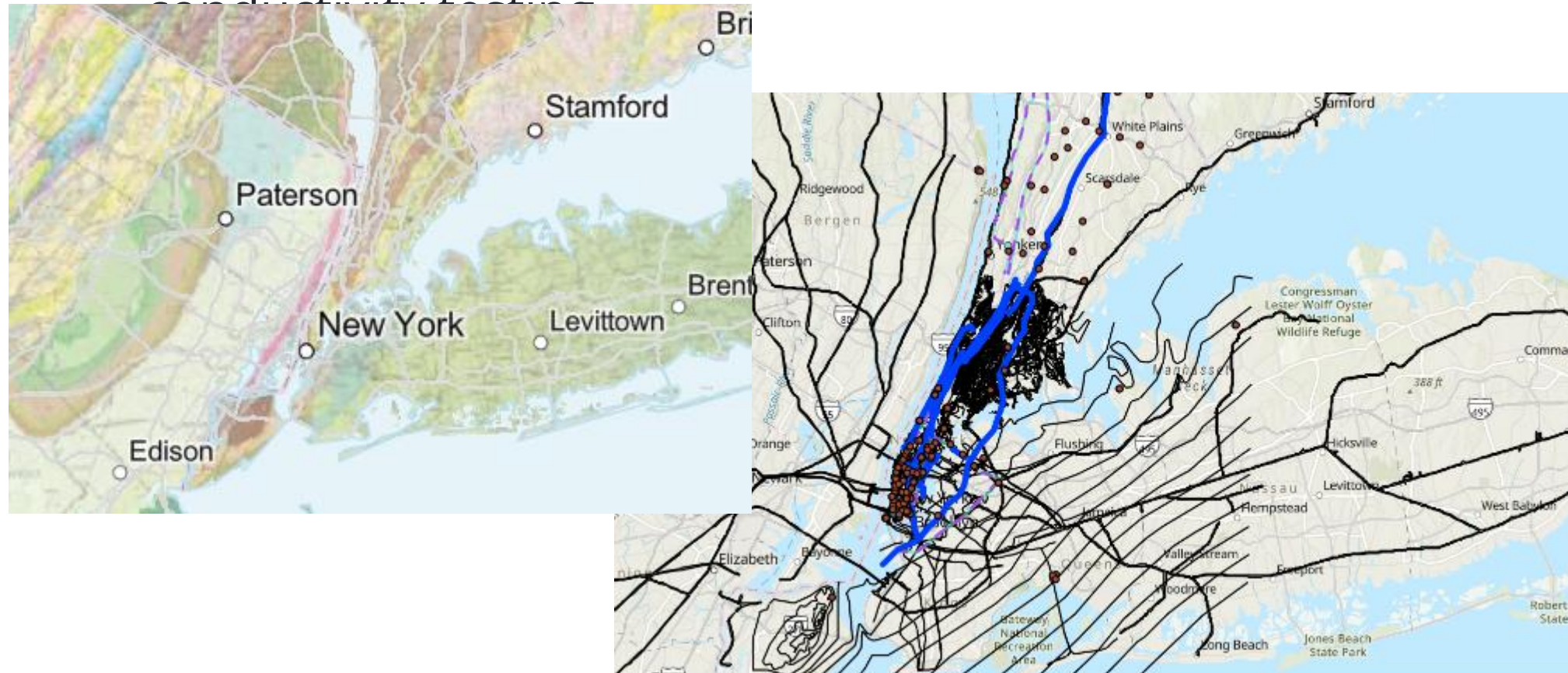
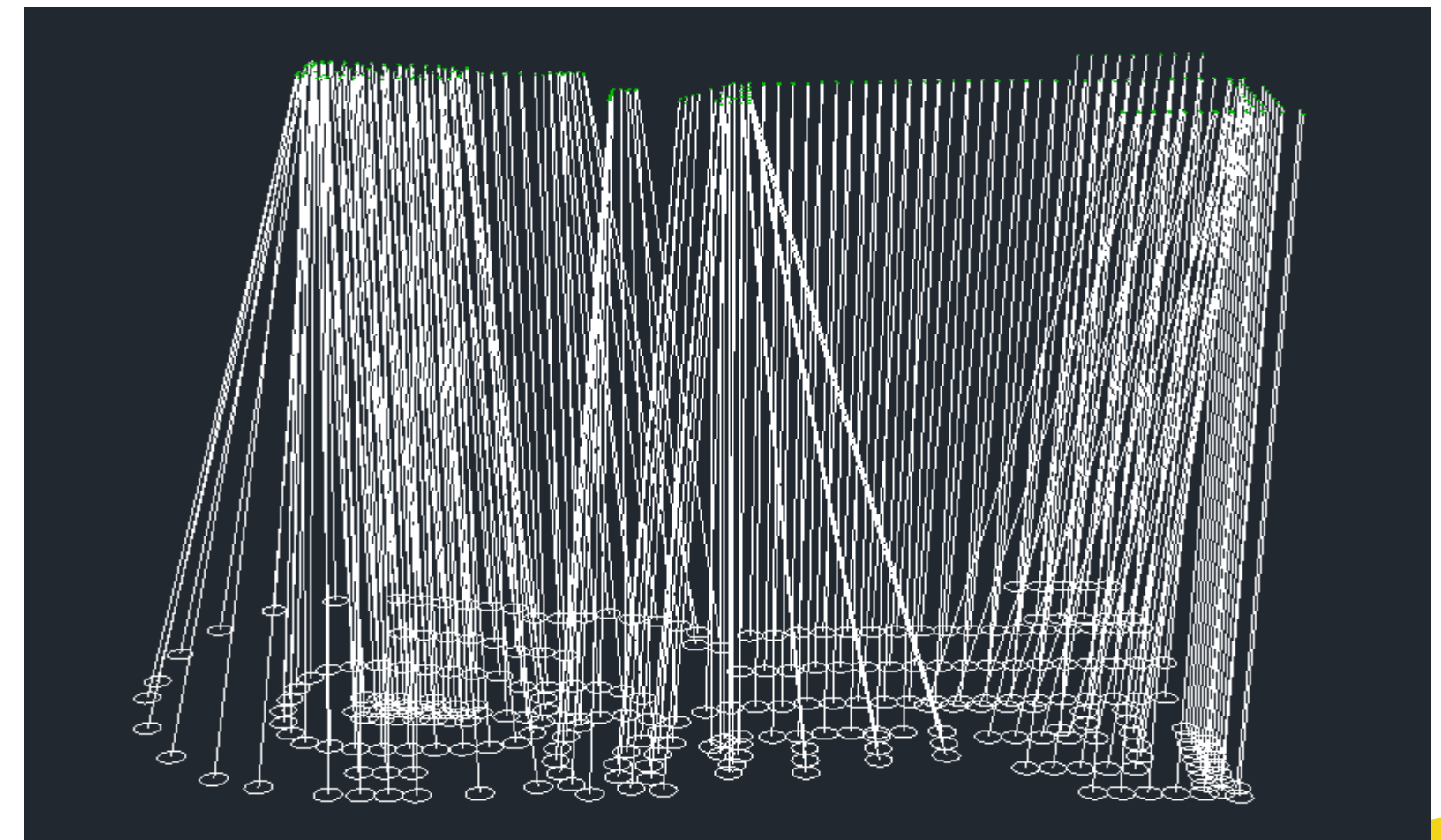
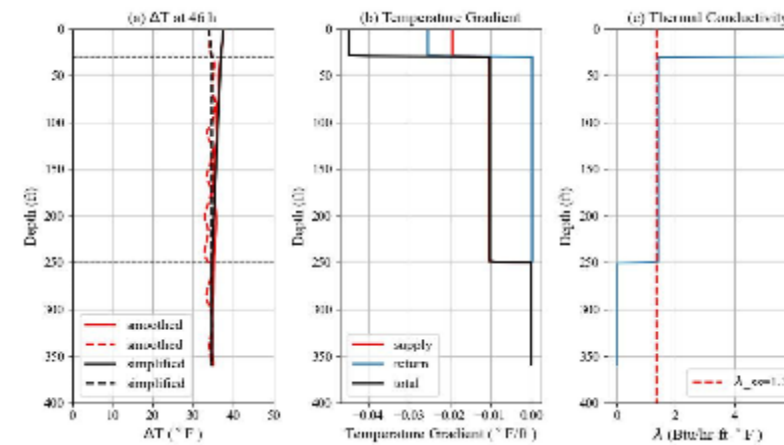


Retrofit Considerations

Surface area constraints, Drilling & Geology, Load requirements & Interior Mechanicals, and Incentives

Subsurface Considerations

Data from reconnaissance of the below grade conditions at site include geology, bedrock depth, and testing of site bedrock with thermal



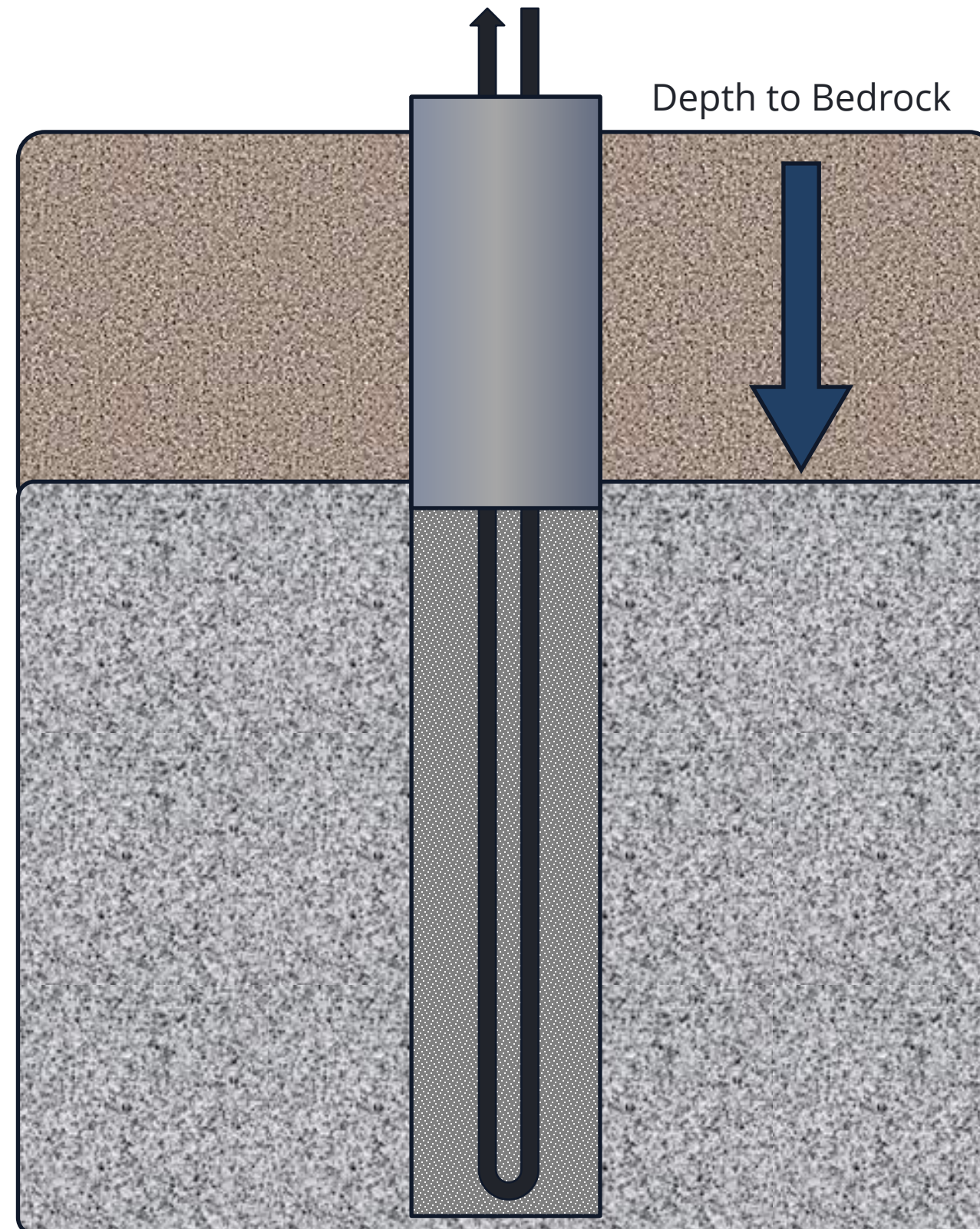
GEOTHERMAL SYSTEMS

BOREFIELD CONSTRUCTION



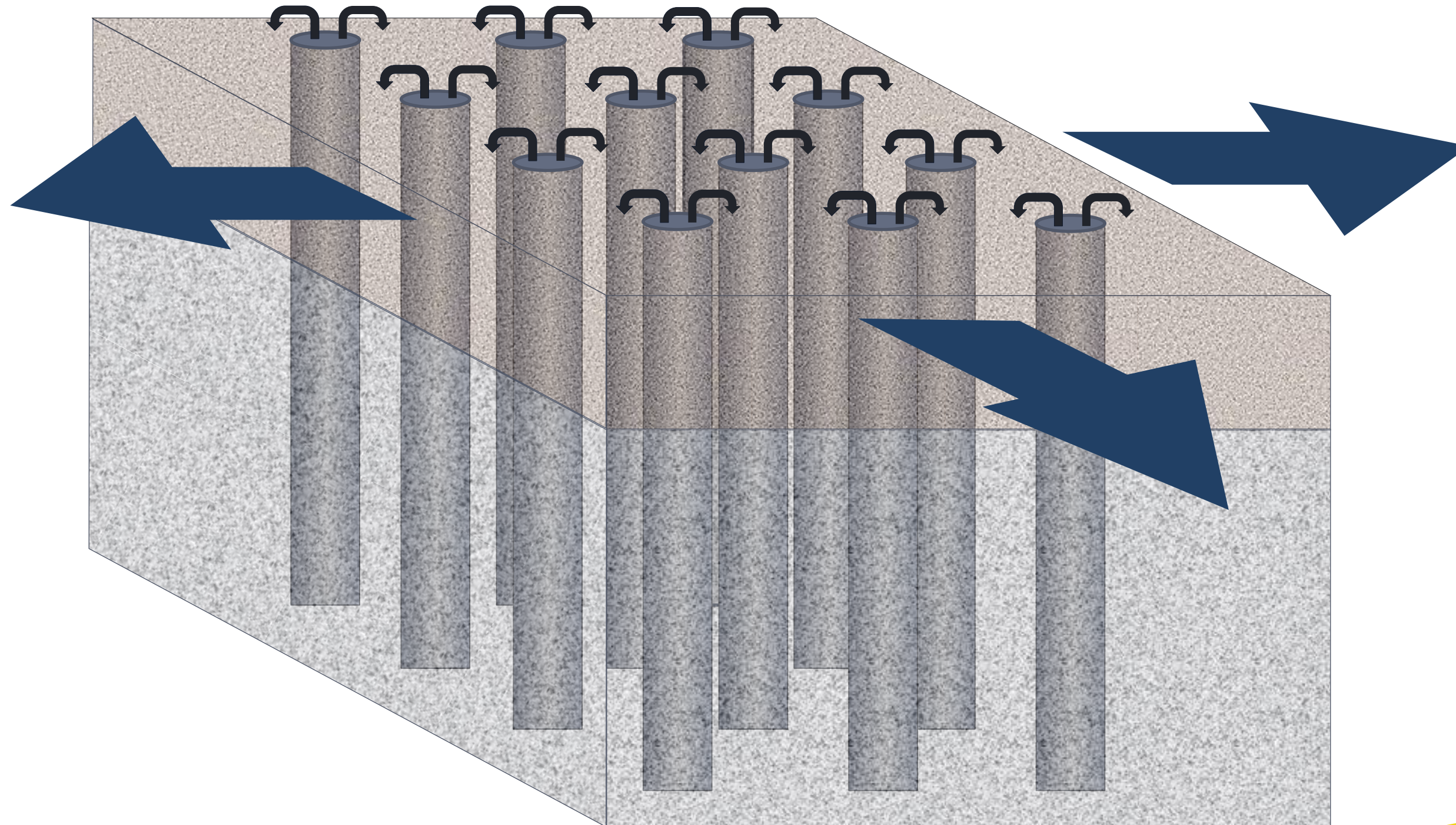
Unconsolidated Formation
Alluvium / Sand / Silt / Clay
(sedimentary)

Consolidated Formation
Bedrock / Granite / Schist
(metamorphic)



GEOTHERMAL SYSTEMS

BOREFIELD CONSTRUCTION

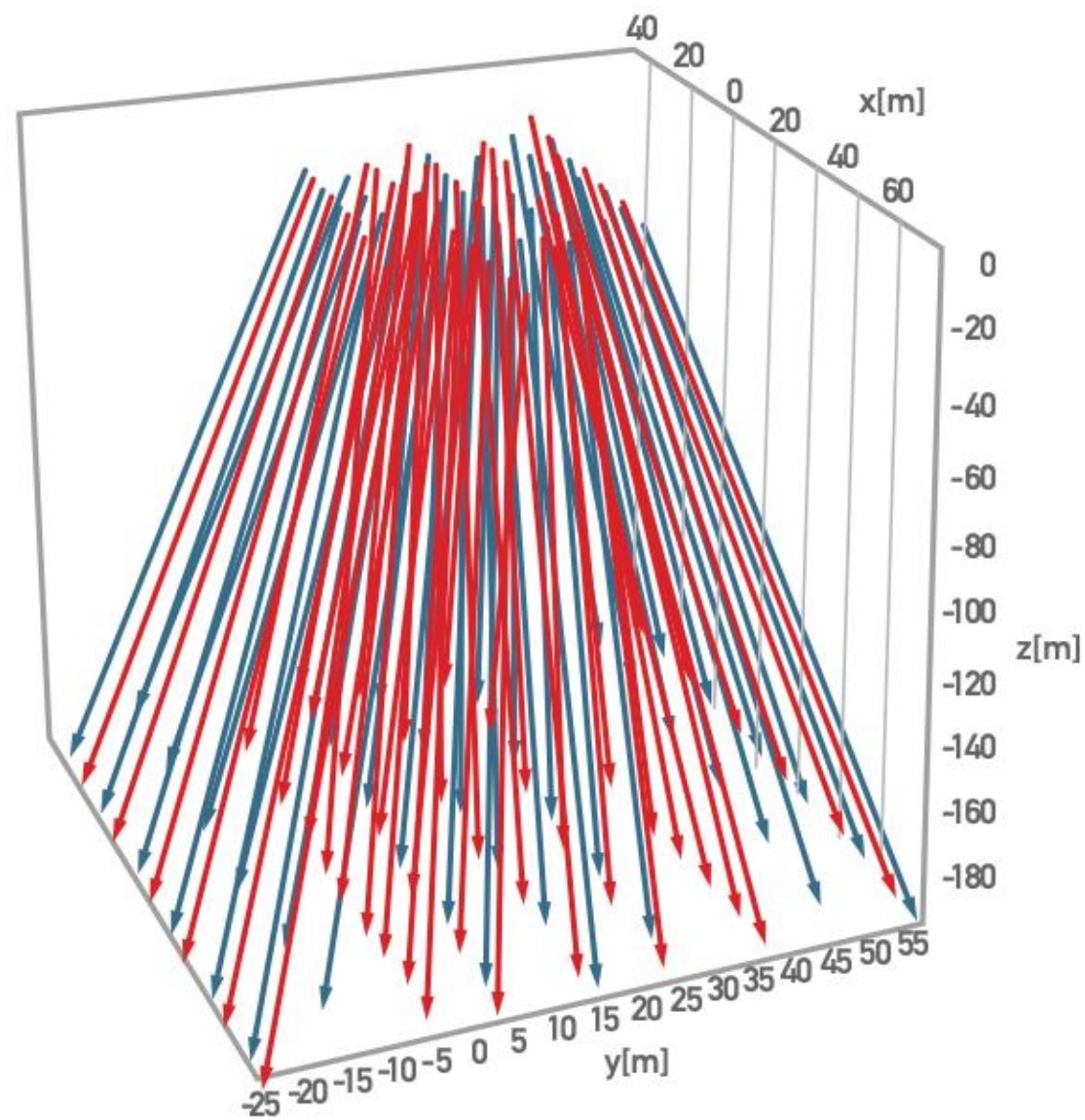


GEOTHERMAL SYSTEMS

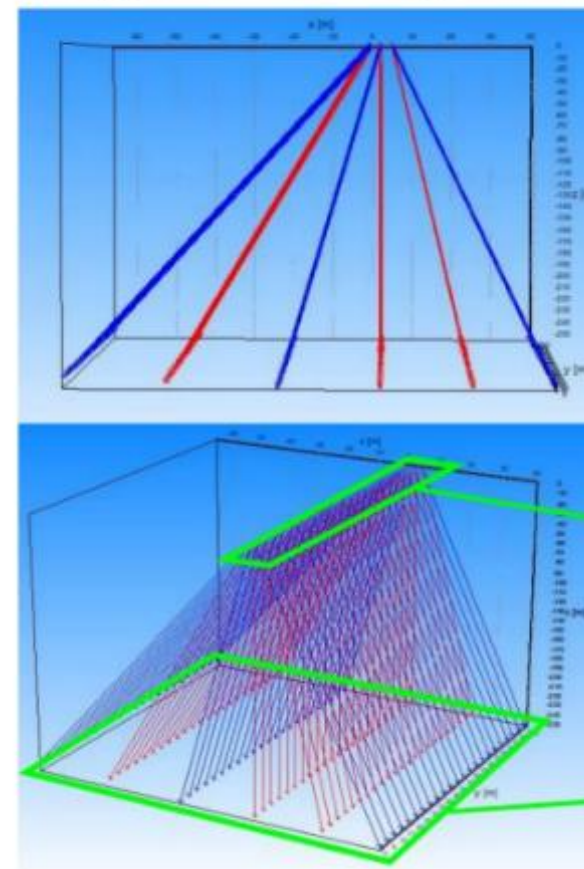
Borefield Construction

Retrofit Considerations

Surface area constraints, Drilling & Geology, Load requirements & Interior Mechanicals, and Incentives



Angled Drilling

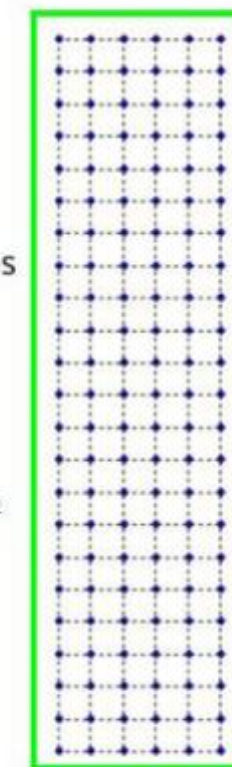


VS

Conventional Drilling

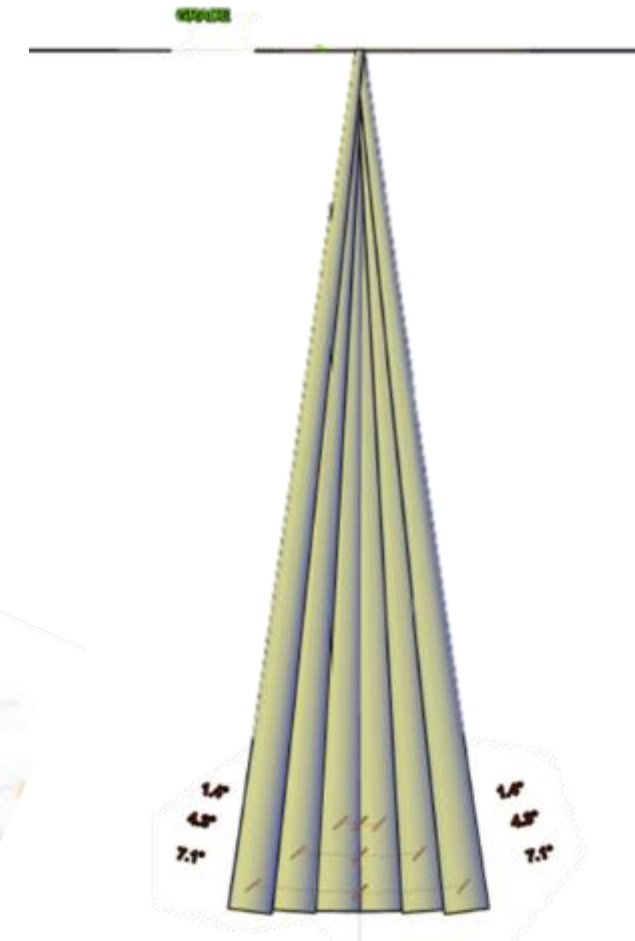
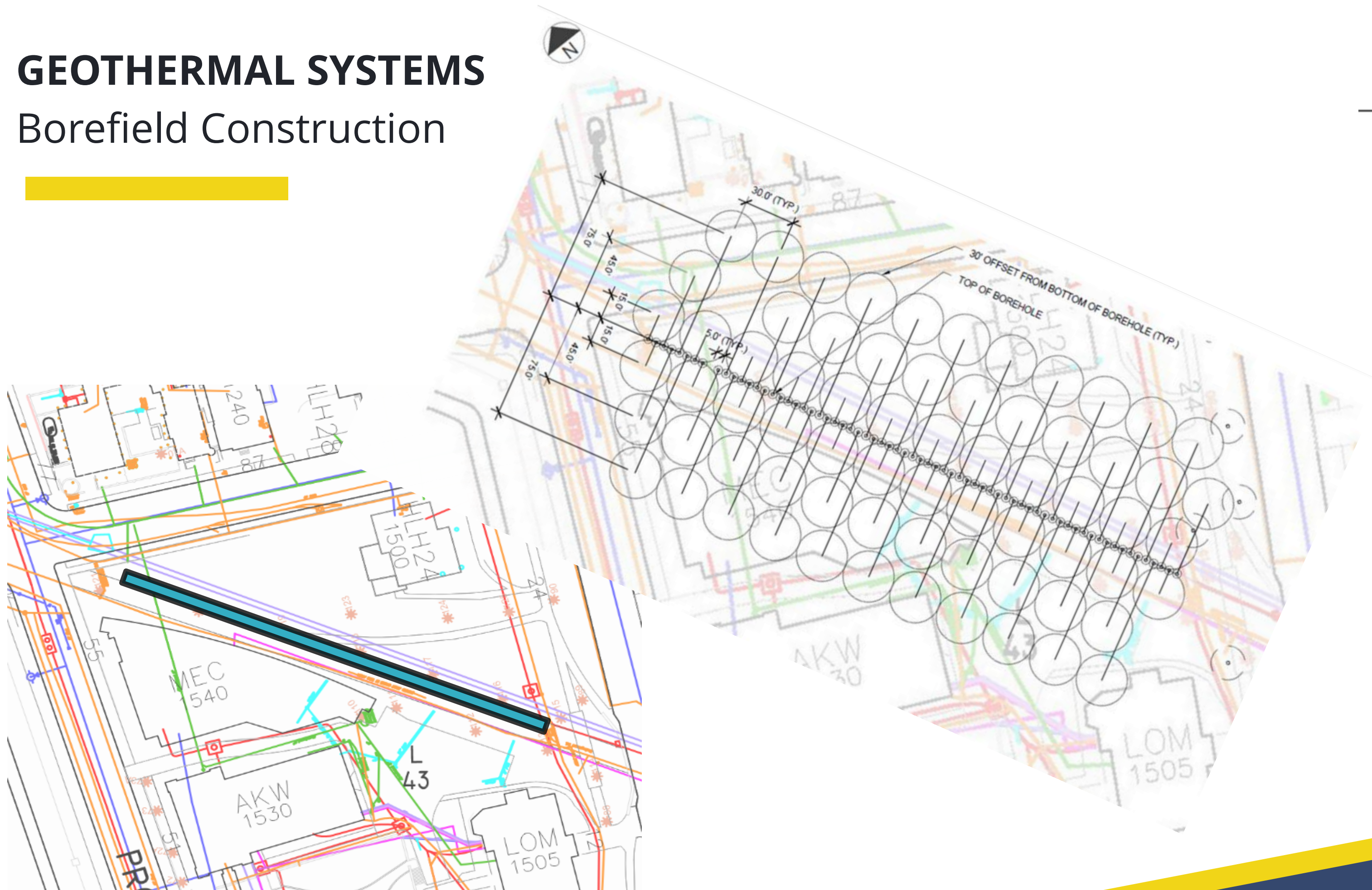
- 138 Boreholes
- 850' Depth
- 5°, 10°, 15° Inclinations
- 7.5' & 15' Spacing

- 138 Boreholes
- 850' Depth
- Vertical Boreholes
- 21' Spacing

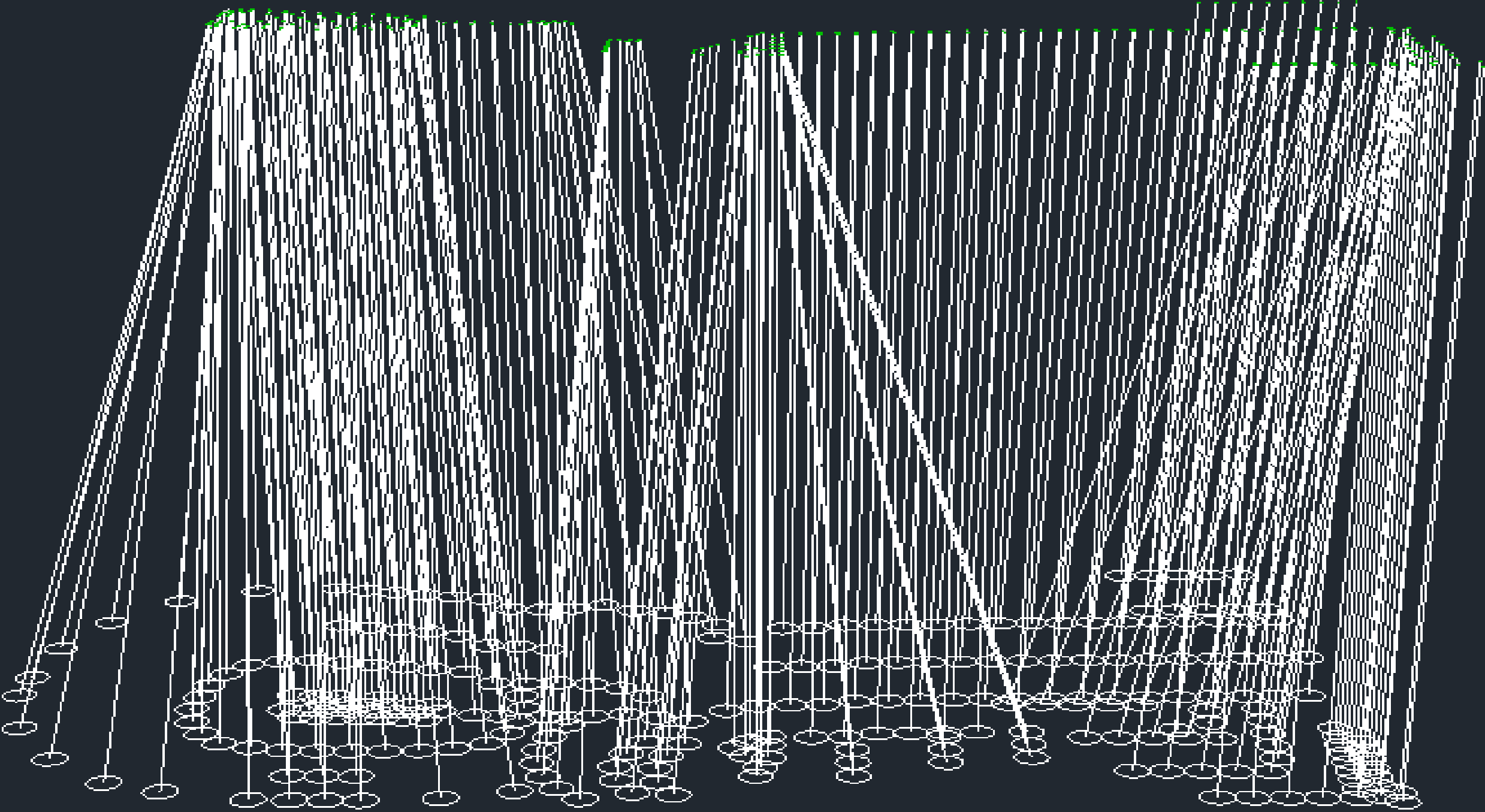


GEOHERMAL SYSTEMS

Borefield Construction



BRIGHTCORE GEOTHERMAL RESERVOIR MODELING AND MONITORING



Geothermal Innovation

 **Brightcore**
BUILDING ENERGY PERFORMANCE™



NYSERDA GRANT PROGRAM HISTORIC BUILDING RETROFIT

The **NYSERDA** Program Opportunity Notice (PON) was for selecting HVAC innovative technology that enables **thermal energy storage** for building applications. The PON was broken up into five distinct areas totaling over \$30M of award potential

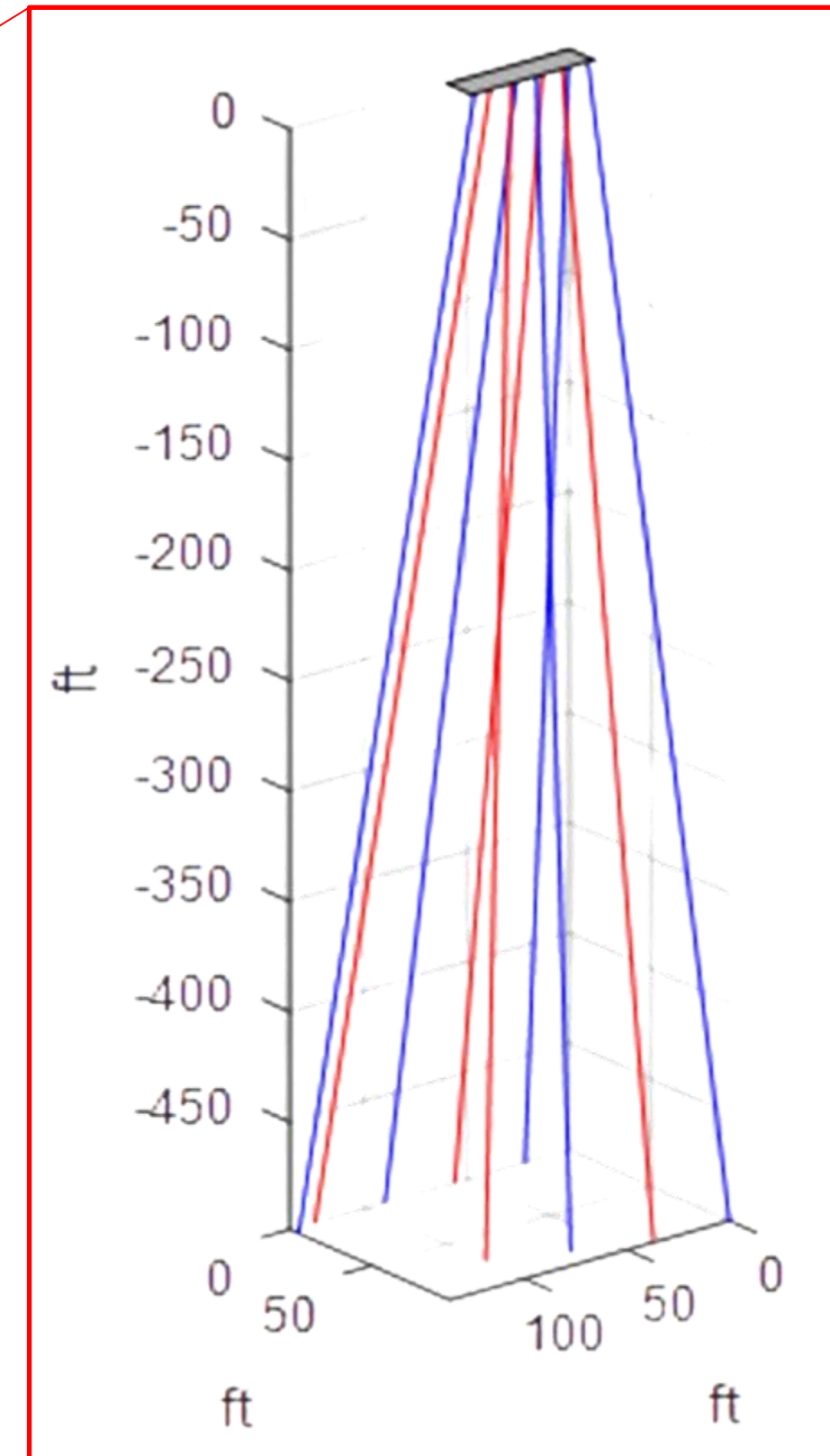
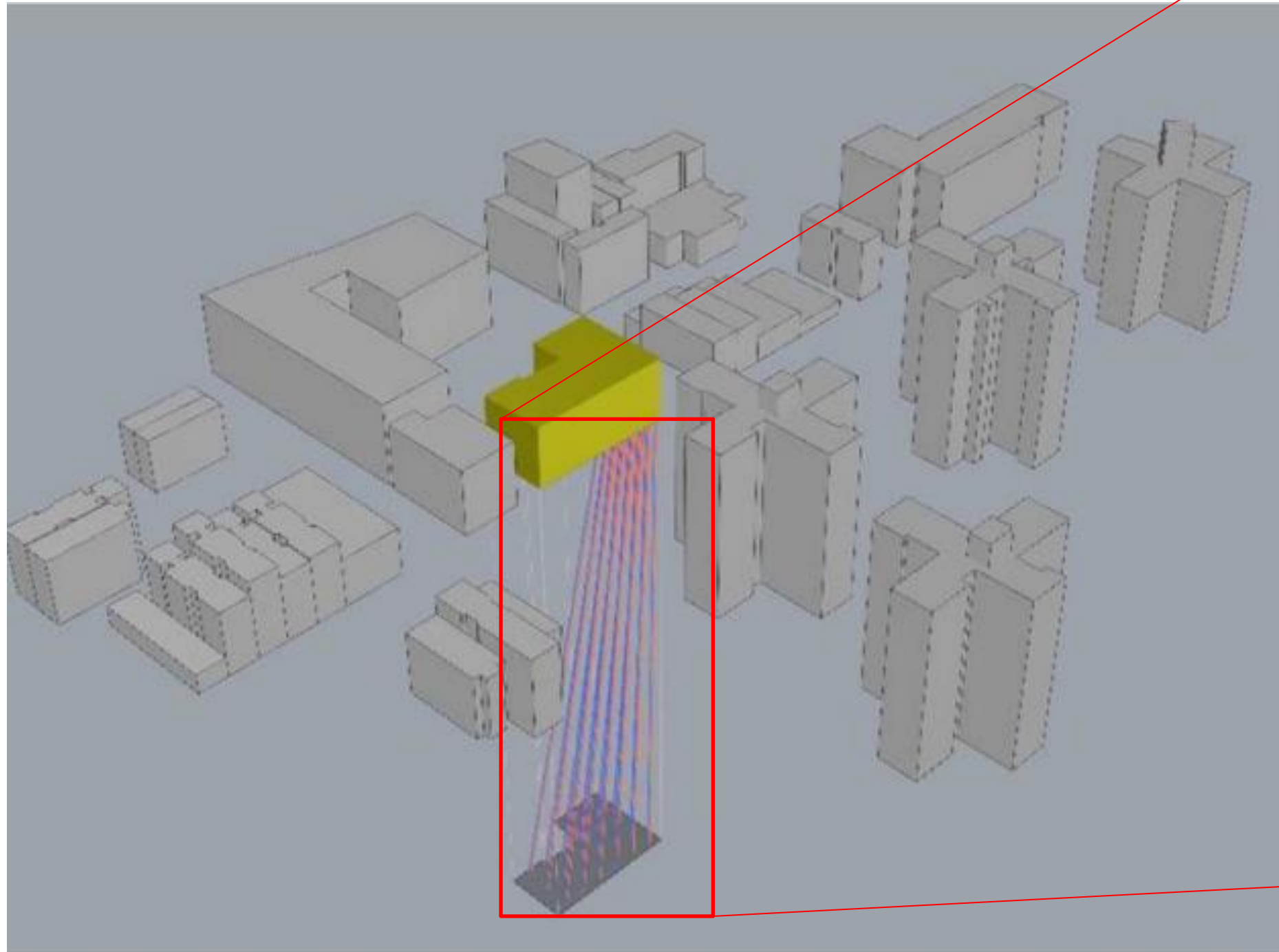
Brightcore was awarded \$500K and selected to deploy the **UrbanGeo™** geothermal solution after a rigorous multi-stage selection process amid 80+ projects.



The Beresford is an architectural landmark and prestigious CO-OP, located in the **Central Park West neighborhood of NYC.**

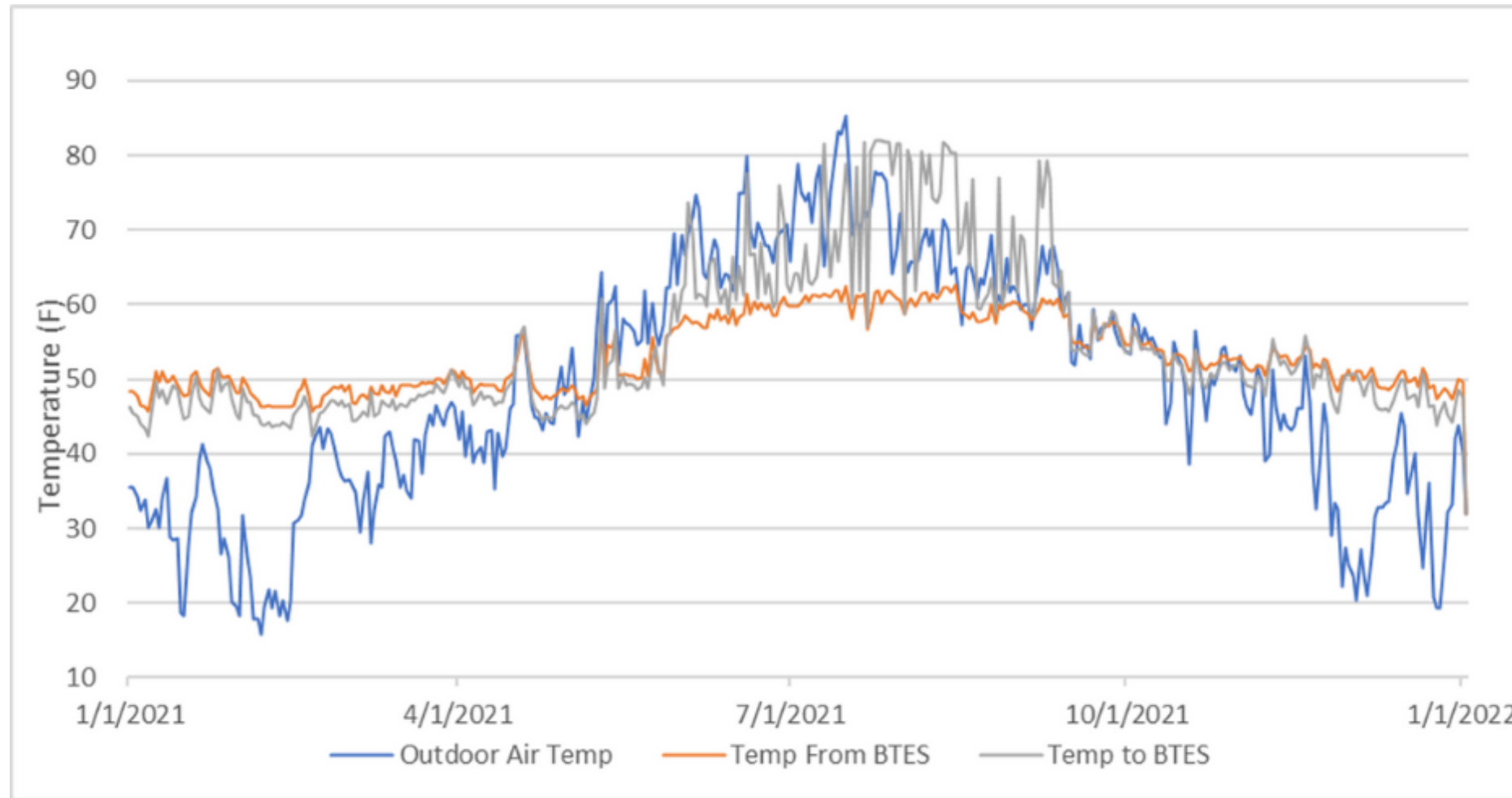
UrbanGeo™

INCLINED BOREHOLE VISUALIZATION

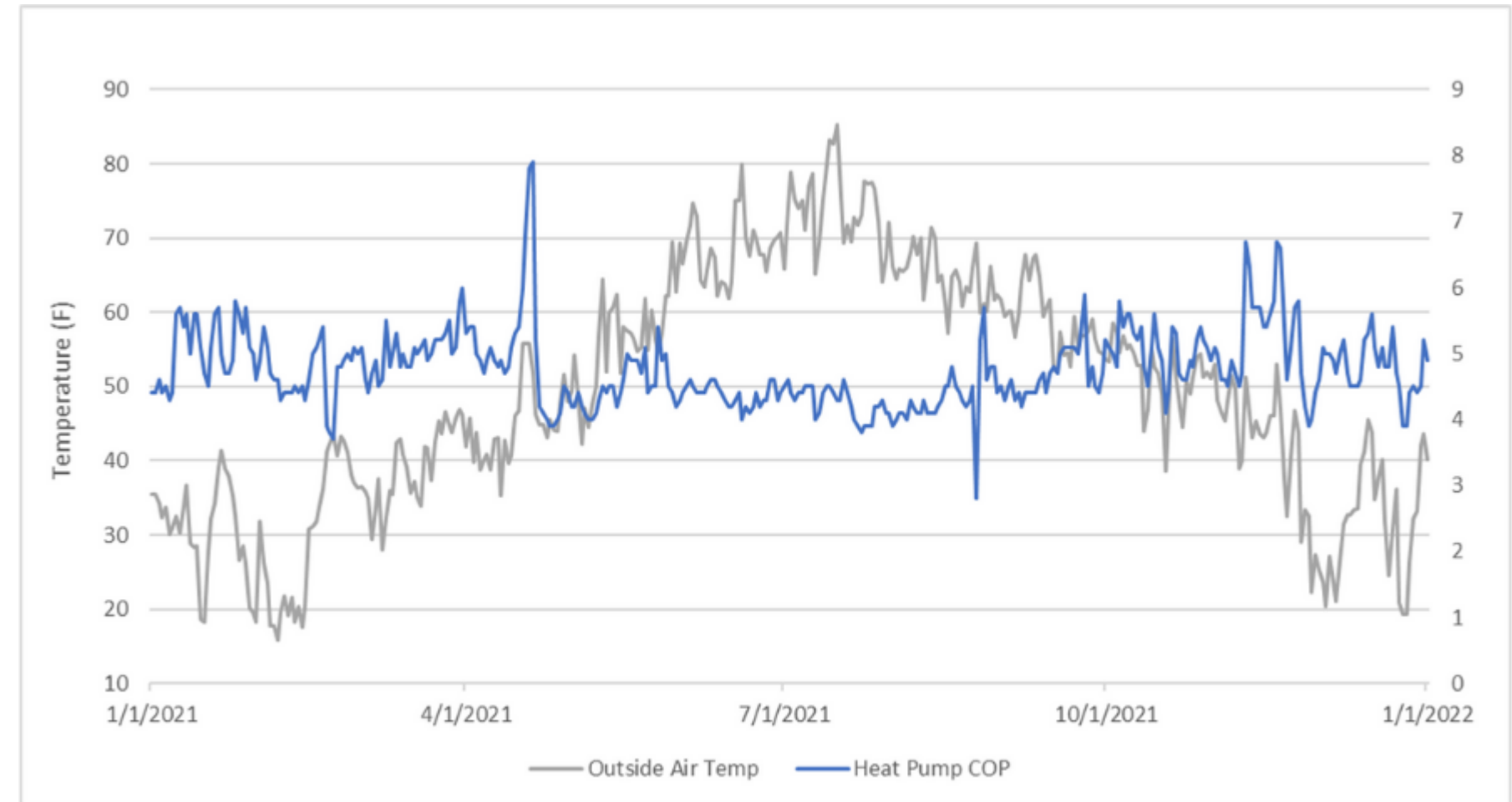


BRIGHTCORE ENERGY

GEOHERMAL ENERGY STORAGE EXAMPLE



Outdoor air temperature and temperature to and from BTES over one year.



Daily COP and outside air temperature with a yearly average COP 4.7.

QUESTIONS & DISCUSSION

 **Brightcore**
BUILDING ENERGY PERFORMANCE™



THANK YOU!

QUESTIONS & DISCUSSION

Jonathan Hernandez
Director of Geoscience

Jonathan.Hernandez@brightcoreenergy.com

BrightcoreEnergy.com